

HEALTH PROFESSIONAL STUDENTS PREPAREDNESS FOR E-HEALTH

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Abstract: –

Background: E-health is one of the recent major developments in healthcare provision. Today's Health Professional Students are considered digitally oriented and this may endow them with the necessary capabilities to implement E-health on graduation. Aim: to assess student's views, use, confidence and need for training on E-health.

Participants: 4th, 5th and internship year students of the medical and dental schools at the Libyan International Medical University. Methods: A cross-sectional study using an online administered survey. Prior to implementation, the questionnaire was reviewed by experts and then piloted on a group of the research targeted students. Likert scale was used for most questions and few were in the form of short answers. Descriptive statistics were reported using SPSS version 20.0.

Results: One hundred and two students responded and all responders were included for most select-response questions. Male to female ratio was 2:3 with a mean age of 24 ± 1.8 years. Medical students accounted for 52% of participants. An average of 45% reported proficiency in written and spoken English. Only 12% have taken IT-related courses. Their view to E-health was moderately positive with a mean of 3.5 ± 0.34 of 3.1 ± 1.029 . In spite of this, $43\pm 3.9\%$ have negative views on E-health. 58% use digital tools and software with a mean score of 2.43 ± 0.6 . Most students reported using social media especially Facebook (Mean 4.95 ± 1.7). Students reported confidence level of ICT use of 3.4 ± 1.2 . They also described their confidence in learning a new technology with a value of 3 ± 0.3 . 32.9% expressed an overall need for training on ICT tools.

Conclusion: The overall preparedness of this group for ICT is moderate and needs improvement. This could be achieved through introducing changes in the taught curriculum.

Keywords - E-health, Health professional, learning confidence, ICT

I. INTRODUCTION

The term ehealth is variably defined and used as it is the case with new terminologies. It is almost impossible to reach an unanimous definition of eHealth [1]. eHealth is defined by WHO, in very simple terms, as "the use of information and communication technologies (ICT) for health [2]. This definition, though simple, is wide and without clear boundaries. In spite of this uncertainty, the term is firmly grounded in academic literature.

Eighty five percent of the member states of the United Nations have an ehealth strategy and 55% have a legislation to protect patient data [3]. The implementation of ehealth facilitates communication between patients and healthcare professional as it is the case in managing diabetes mellitus, cardiac disease, smoking, and cancer prevention [4-7].

One of the main aims of ehealth is to improve health care efficiency and cost effectiveness. Liaw et al, found out that clinical governance could be supported by clinical record systems as clinical indicators of ehealth. On other hand, an e-health web application for laboratory information system was designed and implemented in order to gather laboratory results to monitor HIV epidemic [8]. Besides, computer-based interventions have been used to provide self-management training in order to increase cost effectiveness to patients with type 2 diabetes

[9]. Strategies used to implement ehealth varies from using traditional methods to the use of mobile application for disease management, monitoring and decision making [10-11].

Some of the developing countries are already taking initiatives in implementing ehealth. Kenya for example has multiple initiatives in this regard even though their efficacy was evaluated only sparingly [12]. Telemedicine is highly recommended for developing countries because of scarcity of health professional numbers and the need for distance consultation [13].

For all these reasons, health professionals need to learn and practice using information and communication tools in the setting of healthcare delivery. Unfortunately, intended competencies for health profession graduates mostly don't emphasize the need for mastering ICT tools in the context of healthcare. At best, the competency of using ICT is vaguely mentioned [14].

Current students are expected to be masters of technology tools because they are generally considered as digitally native. These students grew up in a world of digital equipment and they are using ICT in their daily life. It could be speculated that these students will be naturally capable of using ICT once graduated from health professional schools. On contrary, it was found that there is no good correlation between student mastery of ICT and their preference for using their ICT skills in learning. It is also not clear whether health profession students are capable of

transferring their skill of using social media to the real world of health service. This study aims at assessing students' knowledge of ehealth, their.

II. METHODOLOGY

Setting:Libyan International Medical University.

Participants: 4th, 5th and internship students at medical and dental schools.

Type of the study:cross sectional descriptive study.

A questionnaire published by Lam et al, 2016¹⁵ was reviewed by the authors and adopted to the local context. It was then further reviewed by four high rank academics who suggested some changes. The changes were made and an online form using Google Forms was prepared. It was then piloted by a small group of students who belong to the student population under study. Their suggestions were taken into account and the questionnaire was modified accordingly. The link to the final form of the questionnaire was then distributed to participants through Facebook groups and Moodle. Each student was allowed one entry either through Facebook or Moodle. The questionnaire was available to participants for 12 weeks (from 24/12/2017 to 24/02/2018).

Questionnaire description:It included 111 anonymous questions divided into five sections: demographic data (section I) , students' knowledge of ehealth (Section II), students view of ehealth (Section III), use of ICT (Section IV) and confidence using ICT software and devices for ehealth (Section V). Because of inter-dependence of sections 2 and 3, it was made impossible to access section 3 before completing section 2. Forms of answering questions included dichotomous choice, essays and Likert's scales. Negative statements were reciprocally coded on using Likert's scale.

Statistics: an SPSS version 23 was used in the analysis. Results were expressed as counts, percentages, standard deviations and correlations. Groups were compared using unpaired t- test. A p

value of <0.05 was considered statistically significant. Essay responses were theme-categorized.

Ethical issues: the study protocol was presented to the ethical committee at LIMU and approval was obtained. Student's participation was voluntary and answering the questionnaire is considered as a consent to participate.

III. RESULTS

Section I: General & Demographic data: 102 students responded giving an overall response rate of 47.4%. Fifty-three (51.9%) respondents were from the Faculty of Medicine (FOM) and the rest from Dental School (DS). Out of the 53 medical students, 43 (81%), 7(13%) and 3 (5%) belonged to 4th, 5th and internship years respectively. Comparable figures for DS were 7 (14.28%), 25 (51%) and 17 (34.6%) respectively. The mean age was 24.06 ± 1.792 years and females formed 70.6% of all respondents. Majority of students reported that they are either proficient or very proficient in written and spoken English with a mean of 3.4 on a 5-point Likert's scale. Eighty eight percent of students did not take any IT-related courses. The courses taken by the remaining 12 students included ICDL, power point and programming.

Section II: Students' Knowledge of ehealth: The 85 responses in this section were divided into 5 themes, 2 of these were discarded because of non-relevance (10 responses). The remaining 75 responses were grouped into the following themes: use of ICT in providing medical care reported by 30, no knowledge by 40 and organization of patient data by 5.

Section III: Students' view of ehealth: One hundred students (98%) responded to the 16 questions of this section. Overall mean was 3.5 ± 0.9 . The mean for the 6 positively phrased statements was 3.9 ± 0.8 while the corresponding figure for the negatively phrased statements was 3.28 ± 0.97 . Table (1) shows the details.

Table (1): Students view of ehealth

Statement	Mean± St.Dev	Statement	Mean ± St.Dev
1. Engaging in eHealth would improve patient/client care.	4.10±.64	9. I think we are in danger of letting eHealth take over traditional healthcare practices	3.30±1.06
2. The information I get from electronic health records help me give better care to patients	4.00±.74	10. eHealth helps to improve healthcare	3.76±.98
3. Using ICT make my communication with other health professionals faster	4.08±.8	11. Speed with access information using eHealth applications will help me give better care to patients	3.78±.83
4. eHealth applications in healthcare delivery may	3.42±.83	12. Time spent on eHealth is out of proportion to its benefits	3.23±.835

undermine patient confidentiality			
5. I believe that eHealth can help us deliver individualized care	3.79±.95	13. Use of electronic health records would be more of a hindrance than a help to patient care	3.23±.98
6. Using ICT would make my communication with other health professionals less reliable	3.20±1.05	14. I feel there are too many eHealth devices around now	3.36±.92
7. The cost of implementing eHealth would be better used to employ more staff	3.42±1.02	15. Engaging in eHealth would make healthcare staff less productive	3.22±.93
8. Time with patients decrease because of the time I spend working with eHealth tools	3.43±1.10	16. Engaging in eHealth is more trouble than it's worth	3.07±.99

Section IV: Students' use of ICT: Student were asked to report ICT devices they are possessing and using from a prepared list. As shown in figure (1), around 2:3 of the participants own a desktop or tablet computer or smartphone, and more than 85% of the participant own laptop. Smaller percentage of the participants own E-reader, Simple phone and around third of them own MP3, MP4 and/or console games.

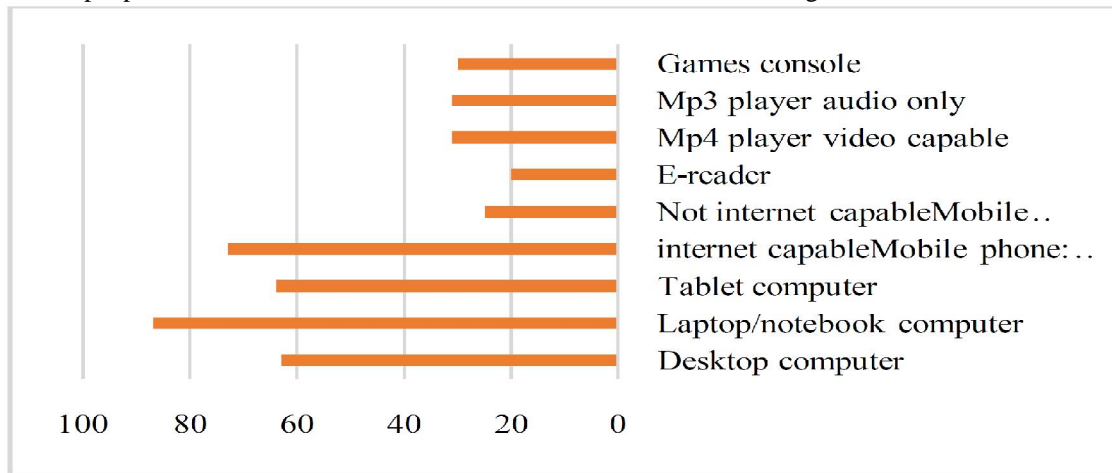


Figure 1 Use of ICT

They were asked about the frequency of use of common software. Twenty-seven and a half never used at least one of the software mentioned in the provided list especially spread sheets, database, data analysis, video conferencing and audio editing Table (2). We also showed that the most commonly used software is power point. Students reported how frequently they are involved in using social media. Two third of the responses reported that they use Facebook like every day.

Table (2) Percentage frequency of use of software

	Never*	Doesn't know the frequency	Monthly	1-2 Times a week	3-4 Times a week	5-6 Times a week	Every day	Total %**
Word processing	7.8	14.7	23.5	10.8	9.8	9.8	18.6	87.2
Presentation e.g PowerPoint	2	6.9	25.5	14.7	8.8	9.8	28.4	94.1
Spreadsheet e.g Excel	42.2	9.8	10.8	8.8	7.8	7.8	2	47
Database	49	8.8	9.8	11.8	2	7.8	2.9	43.1

Data analysis	44.1	10.8	13.7	3.9	2	8.8	4.9	44.1
Video conferencing software	28.4	14.7	12.7	9.8	4.9	7.8	11.8	61.7
Audio editing software	32.4	10.8	20.6	4.9	11.8	6.9	4.9	59.9
Video editing software	23.5	15.7	23.5	4.9	8.8	10.8	5.9	69.6
Image editing software	18.6	9.8	25.5	4.9	13.7	5.9	15.7	75.5

*didn't count to total

** including missing values

Social media and other online activities are being used on regular basis by most of the participants as shown in Table (3). Facebook, video, photo and document sharing were the most commonly used. LinkedIn scored the lowest. Table (4) shows students' involvement in online entertainment, online information gathering, shopping and communication. On the average, 74.8 ± 7.4 % of students are using online entertainment. Respective values for information gathering and communication are 78.8 ± 5 and 81.3 ± 1.4 respectively. Online shopping scored the lowest (53.9%). Ten to 14 percent don't use emails or instant messaging.

Table (3): Frequency of use of social media and online activity

	Never*	Don't know the frequency	Monthly	1-2 Times a week	3-4 Times a week	5-6 Times a week	Every day	Total %**
Facebook	5.9	1	7.8	6.9	7.8	1	68.6	93.1
LinkedIn	45.1	11.8	10.8	6.9	1	2.9	14.7	48.1
Twitter	33.3	1	11.8	9.8	3.9	5.9	29.4	61.8
Sharing content file: e.g. google drive doc	11.8	4.9	15.7	11.8	9.8	3.9	35.3	81.4
Sharing video: e.g. YouTube	12.7	3.9	16.7	11.8	4.9	10.8	36.3	84.4
Sharing photo: e.g. Flickr, Instagram	13.7	4.9	18.6	9.8	15.7	11.8	22.5	83.3
Sharing presentation: e.g. slide share	24.5	4.9	13.7	9.8	12.7	7.8	16.7	65.6
Collaboration e.g. Wikipedia	20.6	5.9	11.8	12.7	13.7	3.9	26.5	74.5
Virtual social worlds: e.g. second life	39.2	6.9	13.7	9.8	6.9	4.9	12.7	54.9
Virtual games.	38.2	4.9	13.7	13.7	4.9	4.9	14.7	56.8

*didn't count to total

** Including missing values

Table (4) The percentage of online activity

		Never*	Don't know the frequency	Monthly	1-2 Times a week	3-4 Times a week	5-6 Times a week	Every day	Total%**
Entertainment	Stream movies	16.7	4.9	27.5	8.8	13.7	6.9	15.7	77.5
	Stream music	11.8	2	14.7	14.7	7.8	9.8	33.3	82.3
	Radio	27.5	3.9	19.6	6.9	9.8	5.9	18.6	64.7
Information gathering	News	16.7	5.9	21.6	17.6	2	3.9	28.4	79.4
	Weather	19.6	9.8	17.6	9.8	2	3.9	26.5	69.6
	Health	9.8	4.9	12.7	8.8	15.7	8.8	33.3	84.2
	Scientific journal articles	14.7	3.9	25.5	16.7	8.8	8.8	14.7	78.4
shopping	eBook	10.8	7.8	22.5	15.7	10.8	5.9	19.6	82.3
	Online Shopping	40.2	5.9	26.5	8.8	2.9	2.9	6.9	53.9
Communication	Email	10.8	5.9	23.5	18.6	4.9	5.9	24.5	83.3
	Instant messaging e.g. WhatsApp?	12.7	2.9	1	17.6	2	2.9	53.9	80.3
	Video chat: e.g. skype, viber, Imo	14.7	3.9	14.7	11.8	7.8	3.9	38.2	80.3

*didn't count to total

** Including missing values

Confidence in learning new ICT skills: participants were asked about how confident they will be in learning how to use new ICT skills. The mean score on a 5-point Likert's scale was 3.1 ± 1.0 . The mean percentage of not being sure of confidence in learning the skills was 25.8 ± 4.29 and the mean percentage of being confident or extremely confident is 51.1 ± 5.4 . Table (5) shows that students are more confident in learning new ICT skills if they get supported.

Table (5): Percentage frequency of confidence in learning new ICT skills

	Extremely Unconfident	Unconfident	Not Sure	Confident	Extremely Confident
if there was no one around to tell you what to do as you go	3.9	19.6	30.4	34.3	8.8
if you only had an instruction manual for reference	4.9	15.7	29.4	36.3	10.8
if you could call someone for help if you got stuck	3.9	12.7	30.4	38.2	10.8
if someone else had helped you get started	4.9	12.7	20.6	42.2	15.7
if you had a lot of time to learn how to do the task	6.9	13.7	21.6	34.3	17.6
if there was someone giving you step by step instructions	4.9	11.8	22.5	39.2	18.6
Mean \pm StDev	4.9 \pm 1.0	14.3 \pm 2.6	25.8 \pm 4.2	37.4 \pm 2.8	13.7 \pm 3.7

Regarding students' personal characteristics in learning new computer technology or online tool, the average for the five favourable personal characteristics was 3.7 ± 0.2 while the average for the five unfavourable characteristics was 2.7 ± 0.2 as measured on a 5-point Likert's scale. There was a statistically significant difference between unfavourable and favourable characteristics in favour of positive ones (t-test: $p = 0.004$). Table (6) shows the percentages for each of these characteristics.

Students were also asked about the perception of the need for training on every software. On average, less than a third felt the need for training with a mean of $29.25\% \pm 14.4$ (95% CI= 26.46-32.05). the only software that students felt a need to receive training in more than 50% of the times were creation of a spreadsheet, managing data with spreadsheet and blogging (Figure 2).

Table (6): Percentages of personal characteristics in learning new Computer Technology

Statement	Extremely Unlike me	Unlike me	Not Sure	Like me	Extremely Like me
expect that I will experience many problems	7.8	18.6	36.3	31.4	0
doubt my ability to solve the problems that may arise	6.9	15.7	37.3	26.5	3.9
need to ask others for help	3.9	18.6	34.3	33.3	2.0
try and persist on my own until it works correctly	2.0	11.8	32.4	30.4	11.8
give up quickly if it doesn't work	8.8	39.2	32.4	6.9	2.9
put a lot of effort into getting it right	2.0	13.7	23.5	37.3	13.7
immediately ask someone else if it doesn't work straight	6.9	19.6	36.3	20.6	4.9

away					
get someone else to do it for me or fix it	12.7	24.5	36.3	12.7	2.9
spend extra time trying to understand what to do	4.9	12.7	27.5	35.3	8.8
get frustrated and annoyed at my lack of progress	7.8	23.5	41.2	16.7	0



Figure 2 Need for Training

DISCUSSION

This paper aims at determining how prepared are the students of two health professional schools at the Libyan International Medical University for using ICT on graduation. The graduates of these two schools are expected to work in digitally-laden environments where graduates face challenges to cope with the new work demands. It took about three months to get the responses from students and after multiple attempts. We had to stop receiving responses because it was clear that it is unlikely to get meaningful increase in responses. Slow and poor response rate is a common phenomenon in questionnaire-based research [16]. We have noticed that persistence in seeking response contributed to increasing the response from participants, a finding noticed by others as well [17]. Females' responses predominated in the group which is contradictory to other reports [18],[19]. Surprisingly, 88% of students didn't take any IT-related courses. This figure is obviously high and probably result from the lack of need to take such courses since the IT-skills needed to study in medical and dental schools are not so dependent on such skills. This calls for real change in the IT-skills used by students for searching and learning. The English mastery overall was good.

Forty-seven percent of participants have no clear idea about what ehealth is. This is more than the double of what has been reported by Lam et al, where only one in five health professional students didn't know

exactly what ehealth is. This highlights the importance of tackling students' illiteracy of ehealth and calls for changes in taught curricula [15].

Although 47% of students didn't know exactly what ehealth is, their overall perception of it is good. Students showed more confidence in agreeing with positive statements (mean score 3.9) but less so with negatively phrased statements (mean score 3.2). In spite of that, this result shows that work need to be done to improve students' perception of ehealth.

A large percentage of students own digital devices and 85% own a laptop. This confirms that we are dealing with digitally-oriented students. Other studies reported similar ownership rates [20]. Ownership of digital devices give students direct access to scientific and educational resources and help connect them with educational forums. However, students owning such devices also use them for non-educational purposes even in classrooms [21]. They may even have a negative impact on learning in classroom. A probable solution for this is to construct instructional activities based on the use of such devices.

27.5 % of students never used software among those included in the questionnaire. Strangely enough, 2% of students never used word processing. However, the main gap was in using data management software such as spread sheets, database and data analysis where around 40% of students reported not using them. This finding is probably explained by lack of instructional activities using data management software. Involving students in research projects might foster learning such software.

An expected finding is the high frequency of use of online activities. This high frequency of use of online activities by students underlies the label given to nowadays students as digital natives. These students use laptops, tablets, smart phones etc. in their daily life and so it was postulated that it would be easier for them to transfer these capabilities to their learning activities and later to the work environment [22],[23]. This trend was observed among dental and medical students alike, simply because these are regular activities undertaken by all students irrespective of their field of education. Nowadays, students seek information from the internet rather than regular books. Providing access to the internet in classrooms may help increase student engagement in learning activities. Therefore, any recommendation coming out of this study should include reference to changes in

classroom setup to allow for use of digital equipment and software.

An important aspect of this paper is the students' confidence in leaning new ICT skills. Self-determination theory focuses on three psychological needs which interact to foster motivation. These include need for competence, relatedness and autonomy [24]. The perception of confidence helps satisfying the need for competence. For this reason, it could be speculated that confident students feel more competent and so have better mastery of their educational environment. The mean confidence in learning new ICT skills by the students included in this study was 3.1 ± 1.0 which shows almost a neutral trend but also shows that the range is wide. Even though around half of students feel either confident or extremely confident, the other half feel either not sure or unconfident. This calls for implementing strategies that could help enhancing students' confidence in learning new ICT skills.

On testing the personal characteristics of students in learning new ICT skills, favourable characteristics predominated with a mean score of 3.7 ± 0.2 . These include persistence, exerting more effort, spending more time and seeking help from others. These favourable characteristics need to be strengthened in any learning program on ICT skills. Changing the mindsets of students could foster their adaptability and response to different challenges [25].

An important dimension in learning is the student perception for need of training. Students having this perception are more likely to be motivated in order to satisfy their need. The students in this study perceived this need only a third of the time. This issue is complicated because measuring perception may not truly reflect what is actually measured. Unfortunately, perception addresses only the first level in Kirkpatrick training evaluation model. The need for training was highly expressed for data management software and these are the same types of software that many students don't have experience with as shown in table (2).

CONCLUSION

This paper shows that the students at LIMU are digital natives. It also shows that there is a need for training on ICT skills for them to be readied for work in healthcare services especially on spread sheets and data management software. In spite of their positive attitude towards ehealth, they overall lack an understanding of what ehealth is exactly about.

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